

NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/6 13/13
NATIONAL DAM SAFETY PROGRAM, LAKE PANORAMA DAM & LAKE PANORAMA --ETC(U)
MAY 81 R J MCDERMOTT, J E GRIBBON DACW61-79-C-0011

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WALLKILL RIVER BASIN
TRIBUTARY TO WALLKILL RIVER,
SUSSEX COUNTY
NEW JERSEY

LAKE PANORAMA DAM &

LAKE PANORAMA DIKE NJ 00816 & NJ 00828

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

MAY 1981

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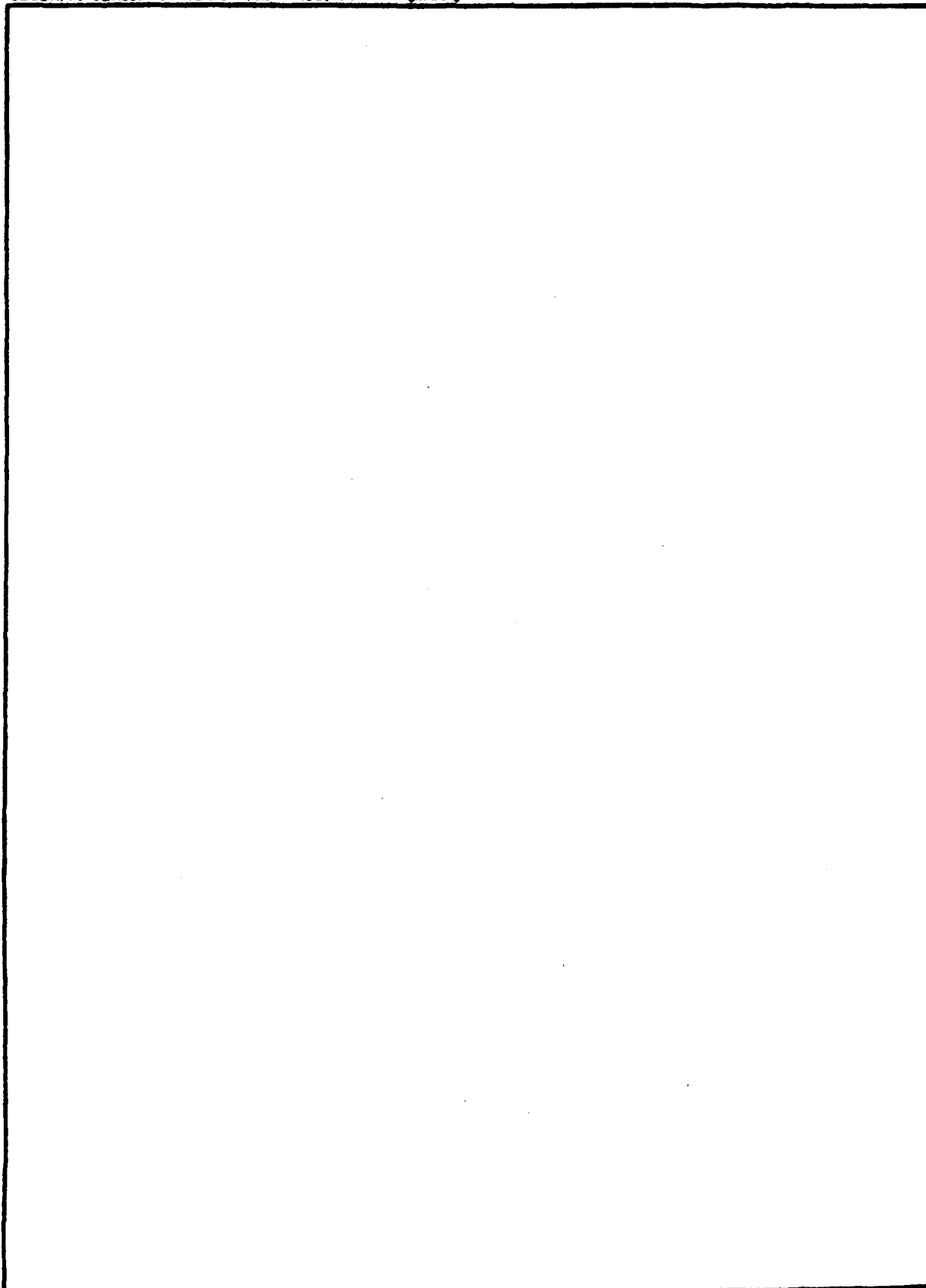
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
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PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

51 JUL 1961

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Panorama Dam and Dike in Sussex County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Panorama Dam and Dike initially listed as high hazard potential structures but reduced to significant hazard potential structures as a result of this inspection, are judged to be in fair overall condition. The spillway of the dam is capable of passing the designated spillway design flood (100-year storm) without an overtopping of the dam or dike and, therefore, is assessed as being adequate.

a. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Assess the stability of the dam and dike embankments. Based on the assessment, a design for embankment improvements should be prepared and the embankments should be repaired accordingly.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

b. Within six months from the date of approval of this report, the following remedial actions should be initiated:

(1) The spillway discharge pipes should be cleaned of accumulated silt and debris and the intake and outlet ends should be reconstructed in such a manner as to ensure that silt and debris will not impede the design capacity of the spillway.

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NAPEN-N

Honorable Brendan T. Byrne

(2) All adverse vegetation on the embankments should be removed.

c. The owner of the dam and dike should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:

Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

LAKE PANORAMA DAM (NJ00816)
LAKE PANORAMA DIKE (NJ00828)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam and dike were inspected on 27 December 1980 by Storch Engineers, under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Lake Panorama Dam and Dike initially listed as high hazard potential structures but reduced to significant hazard potential structures as a result of this inspection, are judged to be in fair overall condition. The spillway of the dam is capable of passing the designated spillway design flood (100-year storm) without an overtopping of the dam or dike and, therefore, is assessed as being adequate.

a. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Assess the stability of the dam and dike embankments. Based on the assessment, a design for embankment improvements should be prepared and the embankments should be repaired accordingly.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

b. Within six months from the date of approval of this report, the following remedial actions should be initiated:

(1) The spillway discharge pipes should be cleaned of accumulated silt and debris and the intake and outlet ends should be reconstructed in such a manner as to ensure that silt and debris will not impede the design capacity of the spillway.

(2) All adverse vegetation on the embankments should be removed.

c. The owner of the dam and dike should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

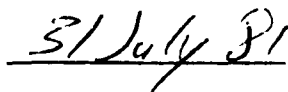
APPROVED:



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE:



PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Lake Panorama Dam, NJ00816
Lake Panorama Dike, NJ00828
State Located: New Jersey
County Located: Sussex
Drainage Basin: Wallkill River
Stream: Tributary to Wallkill River
Date of Inspection: December 27, 1980

Assessment of General Conditions of Dam

Based on visual inspection, past operational performance and Phase I engineering analyses, Lake Panorama Dam and Lake Panorama Dike are assessed as being in fair overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification for both the dam and dike be downgraded from high to significant hazard.

The spillway of the dam is capable of passing the designated spillway design flood (100-year storm) without an overtopping of the dam or dike and, therefore, is assessed as being adequate.

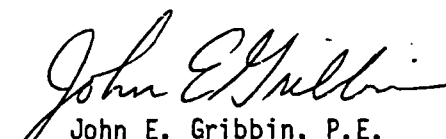
Variations in the slope of the downstream face of the dam together with areas of seepage were observed, indicating the possibility of embankment distress. In addition, seepage at the toe of the dike was observed. It is therefore, recommended that a professional engineer experienced in the design and construction of dams be engaged in the near future to assess the stability of the dam and dike embankments. Based on the assessment, a design for embankment improvements should be prepared and the embankments should be repaired accordingly.

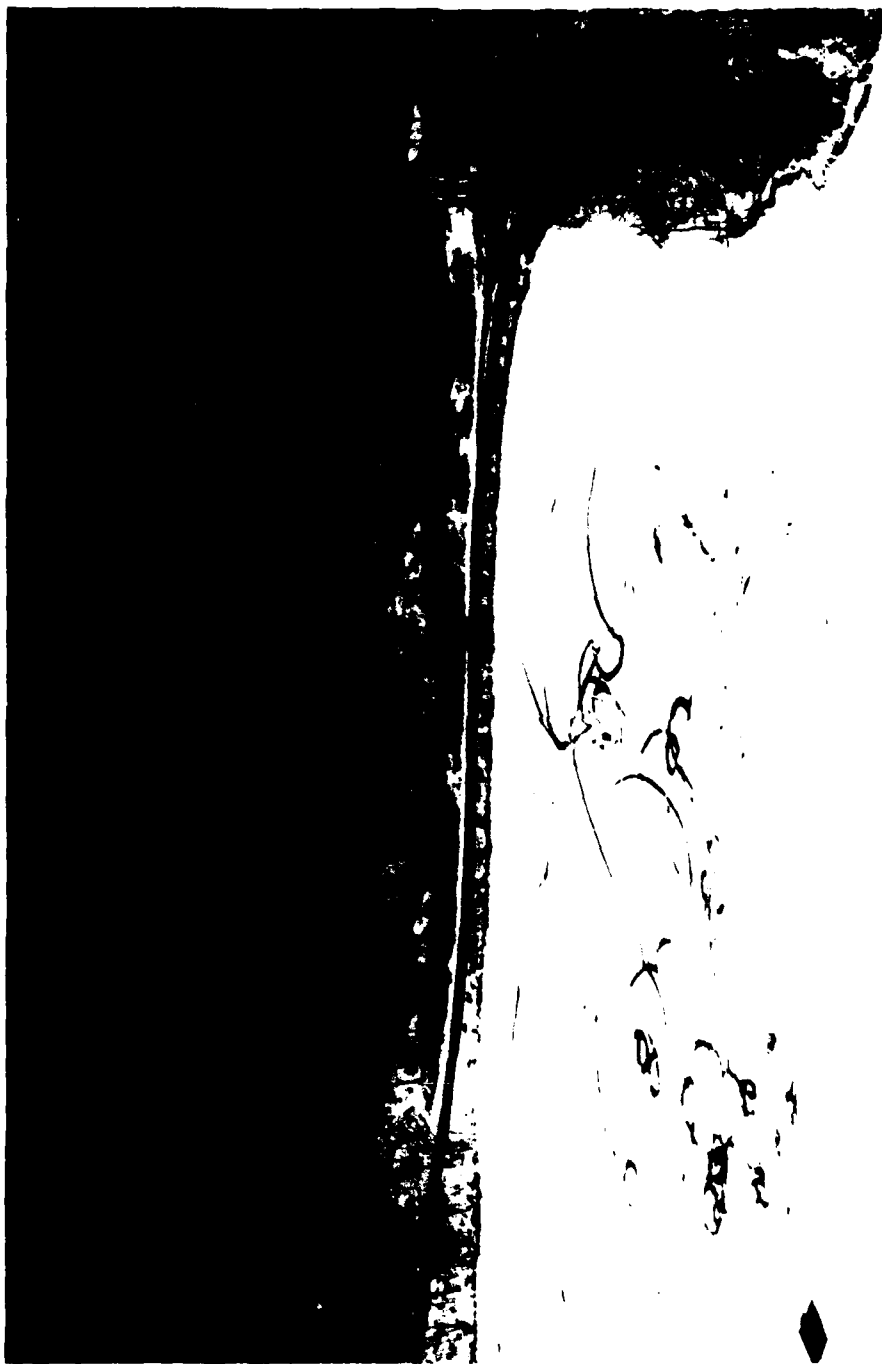
In addition, it is recommended that the following remedial measures be undertaken by the owner in the near future:

- 1) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.
- 2) The spillway discharge pipes should be cleaned of accumulated silt and debris and the intake and outlet ends should be reconstructed in such a manner as to ensure that silt and debris will not impede the design capacity of the spillway.
- 3) All adverse vegetation on the embankments should be removed.

In the future, the owner of the dam and dike should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam and dike.


Richard J. McDermott, P.E.


John E. Gribbin, P.E.



OVERVIEW - LAKE PANORAMA DAM

20 JANUARY 1981

TABLE OF CONTENTS

	<u>Page</u>
ASSESSMENT OF GENERAL CONDITION OF DAM	i
OVERVIEW PHOTO	iii
TABLE OF CONTENTS	iv
PREFACE	vi
SECTION 1 - PROJECT INFORMATION	1
1.1 General	
1.2 Description of Project	
1.3 Pertinent Data	
SECTION 2 - ENGINEERING DATA	7
2.1 Design	
2.2 Construction	
2.3 Operation	
2.4 Evaluation	
SECTION 3 - VISUAL INSPECTION	8
3.1 Findings	
SECTION 4 - OPERATIONAL PROCEDURES	11
4.1 Procedures	
4.2 Maintenance of Dam	
4.3 Maintenance of Operating Facilities	
4.4 Description of Warning System	
4.5 Evaluation	

TABLE OF CONTENTS (cont.)

	<u>Page</u>
SECTION 5 - HYDRAULIC/HYDROLOGIC	12
5.1 Evaluation of Features	
SECTION 6 - STRUCTURAL STABILITY	14
6.1 Evaluation of Structural Stability	
SECTION 7 - ASSESSMENT AND RECOMMENDATIONS	16
7.1 Dam Assessment	
7.2 Recommendations	
PLATES	
1 KEY MAP	
2 VICINTIY MAP	
3 SOIL MAP	
4 GENERAL PLAN	
5 PHOTO LOCATION PLAN	
APPENDICES	
1 Check List - Visual Inspection	
Check List - Engineering Data	
2 Photographs	
3 Engineering Data	
4 Hydraulic/Hydrologic Computations	
5 Bibliography	

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydraulic and hydrologic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydraulic and hydrologic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

LAKE PANORAMA DAM, I.D. NJ00816
LAKE PANORAMA DIKE, I.D. NJ00828

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Lake Panorama Dam and Lake Panorama Dike was made on December 27, 1980. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam and dike structures and appurtenances.

1.2 Description of Project

a. Description

Lake Panorama Dam is an earth embankment with a spillway consisting of three 12-inch concrete culvert pipes that transversely penetrate the dam. In addition to the dam, Lake Panorama Dike located to the south or left of the dam, impounds Lake Panorama. An unpaved road is located on the crests of both the dam and dike which are separated by a distance of approximately 200 feet.

Having an overall crest length of 335 feet, the dam has crest elevations of: 1023.0 National Geodetic Vertical Datum (N.G.V.D.) for the northern or left end, 1022.0 at the center, and 1022.5 for the southern or right end. The downstream toe of dam is at elevation 1001.8 resulting in an overall height of 20.2 feet. The crest width is 28 feet and the downstream face has a slope of 2.5 horizontal to 1 vertical.

Having an overall crest length of 80 feet, the dike has crest elevations of 1022.5 at the northern or left end and 1027.2 at the southern or right end. The downstream toe of the dike is at elevation 1007.2 and the overall height is 15.3 feet. The width of the dike crest is 28 feet and the slope of the downstream face is 3 horizontal to 1 vertical.

The principal spillway consists of three (3) 12-inch concrete culvert pipes transversely penetrating the dam and each having a length of 28.2 feet. The upstream invert (spillway crest) is at elevation 1020.0 and the downstream invert is at 1017.5. A group of large boulders is located on the downstream side of the dam below the spillway. The boulders may be intended as an energy dissipator.

b. Location

Lake Panorama Dam and Dike are located in Vernon Township, Sussex County, New Jersey. They impound a recreational lake located within a private housing development. Principal access to the dam and dike is through the development which is entered from Route 565. Panorama Drive traverses the crests of the dam and dike. Discharge from the spillway of the dam flows overland with no distinct streambed for approximately 3000 feet thence into an unnamed tributary of the Wallkill River which is located approximately 2 miles downstream from the dam.

c. Size and Hazard Classification

The dam is classified in accordance with criteria presented in "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers. Size categories consist of Small, Intermediate and Large while hazard categories are designated as Low, Significant and High.

Size Classification: Lake Panorama Dam is classified as "Small" size since its maximum storage volume is 84 acre-feet (which is less than 1000 acre-feet) and its height is 20.2 feet (which is less than 40 feet). Lake Panorama Dike is classified as "Small" size since its maximum storage volume is 89 acre-feet (which is less than 1000 acre-feet) and its height is 15.3 feet (which is less than 40 feet).

Hazard Classification: Visual inspection of the downstream flood plain of the dam indicates that failure of the dam could inundate the dwelling located near the right end of the dam. In addition, failure of the dam could partially inundate the road 6000 feet downstream. Loss of more than a few lives is not anticipated.

Visual inspection of the downstream flood plain of the dike indicates that failure of the dike could inundate one dwelling and a local road located 1300 feet downstream.

In addition, failure of the dike could possibly cause partial inundation of dwellings at Wallkill Lake located approximately 3800 feet from the dike. Loss of more than a few lives is not anticipated. Accordingly, Lake Panorama Dam and Dike are classified as "Significant" hazard.

d. Ownership

Lake Panorama Dam and Dike are owned and operated by the Lake Panorama Community Association, P.O. Box 91, Glenwood, New Jersey 07418.

e. Purpose of Dam

The purpose of the dam and dike is the impoundment of a lake used for recreation.

f. Design and Construction History

Lake Panorama Dam and Dike reportedly were constructed by the Beyer Corporation in 1957 as part of the Lake Panorama Development.

g. Normal Operation Procedures

The dam, dike and appurtenances are operated and maintained by the Lake Panorama Community Association. Repairs are made on an "as needed" basis.

1.3 Pertinent Data

a.	Drainage Area	0.06 square miles
b.	Discharge at Damsite	
	Maximum flood at damsite	Unknown
	Outlet works at pool elevation	N.A.
	Spillway capacity at top of dam	15 cfs
c.	Elevation (N.G.V.D.)	
	Top of dam	1022.0
	Top of Dike	1022.5
	Maximum pool-design surcharge	1021.2
	Spillway crest	1020.0
	Stream bed at toe of dam	1001.8
	Stream bed at toe of dike	1007.2
	Maximum tailwater	N.A.
d.	Reservoir	
	Length of maximum pool	900 feet (Estimated)
	Length of recreation pool	850 feet (Scaled)
e.	Storage (Acre-feet)	
	Recreation pool	64
	Design surcharge	76
	Top of dam	84
	Top of dike	89
f.	Reservoir Surface (acres)	
	Top of dam	10.3 (Estimated)
	Maximum pool - design surcharge	10.0 (Estimated)
	Recreation pool	9.6

g. Dam

Type	Earthfill
Length	335 feet
Height	20.2 feet
Sideslopes - Upstream	1 horiz. to 1 vert.
- Downstream	2.5 horiz. to 1 vert.
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Dike

Type	Earthfill
Length	80 feet
Height	15.3 feet
Sideslopes - Upstream	1 horiz. to 1 vert.
- Downstream	3 horiz. to 1 vert.
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

i. Spillway

Type	(3) 12-inch concrete pipes
Length of weir	3 feet
Crest elevation	1020.0
Gates	N.A.
Approach channel	N.A.
Discharge channel	No distinct downstream channel

j. Regulating outlet

N.A.

k. Diversion and Regulating Tunnel

N.A.

SECTION 2: ENGINEERING DATA

2.1 Design

No plans or calculations pertaining to the original construction of the dam and dike could be obtained.

2.2 Construction

No data or reports pertaining to the construction of the dam and dike are available.

2.3 Operation

No data or reports pertaining to the operation of the dam and dike are available.

2.4 Evaluation

a. Availability

No data or reports pertaining to the operations of the dam and dike are available.

b. Adequacy

Available engineering data pertaining to Lake Panorama Dam and Dike is not adequate to be of significant assistance to the performance of a Phase I evaluation. A list of absent information is included in paragraph 7.1.b.

c. Validity

The validity of engineering data cannot be assessed due to the absence of data.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The inspection of Lake Panorama Dam and Dike was performed on December 27, 1980 by staff members of Storch Engineers. A copy of the visual inspection check list is contained in Appendix 1. The following procedures were employed for the inspection:

- 1) The embankment of the dam and dike, appurtenant structures and adjacent areas were examined.
- 2) The dam and dike were measured and key elevations determined with the use of a surveyor's level.
- 3) The dam and dike embankments, appurtenant structures and adjacent areas were photographed.
- 4) The downstream flood plain was toured to evaluate downstream development and restricting structures.

b. Dam and Dike

The crest of dam appeared to be generally evenly graded. The upstream side contained tall grass, weeds and small trees. Also, a series of boulders were observed along the upstream side of the dam and appeared to be for a decorative purpose. Boulders on the upstream side were observed at the waterline, but their placement appeared haphazard and they did not appear to be riprap. Most of the surface of the dam was obscured by snow at the time of inspection.

The downstream side of the dam was irregularly graded and had a depression at its center at the location of the spillway. The depressed portion could be due to sloughing of the downstream side or due to erosion from discharge through the spillway. The downstream side was overgrown with briars, bushes and trees. A few scattered boulders were also present.

Also present on the downstream side was debris in the form of cut trees and bushes. It appeared that the downstream side has been used as a dump. It appeared that soil has been dumped on the downstream side as well, or the appearance could be due to the fact that the embankment was not properly compacted.

The downstream surface of the dike was covered with weeds, briars, small trees and boulders, ranging in size from 3 feet to 5 feet. The dike appeared to have been constructed in a natural channel or glen leading away from the lake site; however the channel appeared to no longer carry any discharge from the lake. It appeared that the main stream leading away from the lake area came through the location of the dike.

Three points of seepage were observed on the downstream side of the dam near the toe and one at the downstream toe of the dike. Each of the four locations was characterized as a localized discharge containing orange colored deposits. One point of seepage, located near the right end of the dam was discharging at a rate of approximately 2 to 3 gallons per minute; the remaining three points were discharging at lesser rates.

c. Appurtenant Structures

The condition of the concrete comprising the three culverts appeared to be satisfactory. However, the pipes were significantly silted at the downstream end.

At the time of inspection the lake level was approximately 1 to 2 inches below the inverts of the discharge pipes. Only the southern 12 inch pipe was open while both remaining discharge pipes were completely covered on the downstream side with silt and would not be able to maintain normal flow.

d. Reservoir Area

The reservoir is generally wooded around its entire shoreline. It has steep, rocky slopes with some houses near the shoreline. The impoundment of the dam and dike is 1000 feet long with a width varying from 350 feet to 500 feet.

e. Downstream Channel

The downstream channel leading away from the dike area did not appear to be a perennial stream, but was a deeply cut swale or gorge running down the side of the mountain. It was very rocky with boulders and rock outcrops in its bed. It had steep wooded banks with slopes of approximately 50 to 100 percent. A housing development had been constructed in the vicinity of the lake and downstream flood plain. A road had been constructed across the swale at a location approximately 1300 feet from the dike. A house had been constructed in the swale bed at that location.

There appeared to be no distinct downstream channel immediately downstream from the spillway of the dam. Apparently, during times of high lake stage, outflow from the spillway travels overland down the side of the mountain downstream from the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in Lake Panorama is regulated by discharge through the three (3) 12-inch concrete pipe culverts which comprise the spillway for the dam.

The dam does not include a low level outlet, thus precluding easy drawdown of the lake.

4.2 Maintenance of the Dam

Reportedly, maintenance of the dam and dike is performed only on an "as needed" basis.

4.3 Maintenance of Operating Facilities

Reportedly, regular maintenance of operating facilities consists of cleaning the spillway culvert pipes each spring by the maintenance crew of the Lake Panorama Community Association.

4.5 Evaluation of Operational Adequacy

The operation of the dam and dike has been successful to the extent that the dam reportedly has not been overtopped.

Maintenance documentation is poor and the maintenance program for the dam and dike has not been adequate in the following areas:

- 1) Spillway culvert pipes not properly cleaned of silt accumulation.
- 2) Eroded or sloughed areas of the downstream face of dam directly below spillway not properly repaired.
- 3) Trees and bushes on the embankments not removed.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The quantity of storm water runoff that the spillway should be able to handle is based on the size and hazard classification of the dam. This runoff quantity called the spillway design flood (SDF) is described in terms of return frequency or probable maximum flood (PMF) depending on the extent of the dam's size and potential hazard. According to the "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers, the SDF for Lake Panorama Dam and Dike falls in a range of 100-year storm to 1/2 PMF. In this case, the low end of the range, 100-year storm, is chosen since the factors used to select size and hazard classification are on the low side of their respective ranges.

The SDF peak computed for Lake Panorama Dam is 110 c.f.s. This value is derived from the 100-year flood hydrograph computed by the use of the HEC-1-DAM Flood Hydrograph Computer Program using the Soil Conservation Service triangular unit hydrograph with curvilinear transformation. Hydrologic computations and computer output are contained in Appendix 4.

The spillway discharge rates were computed by the use of culvert capacity charts assuming inlet control. The total spillway discharge with lake level equal to the top of the dam was computed to be 15 c.f.s. The SDF was routed through the dam by use of the HEC-1-DAM computer program using the modified Puls method. In routing the SDF, it was found that the dam crest would not be overtopped with 0.8 foot of freeboard remaining. Accordingly, the subject spillway is assessed as being adequate in accordance with criteria developed by the U.S. Army Corps of Engineers.

b. Experience Data

Reportedly, the dam and dike have not been overtopped since construction.

c. Visual Observation

Although the downstream faces of the dam and dike were found to be irregular, no specific evidence of overtopping was observed.

d. Overtopping Potential

As indicated in paragraph 5.1.a., a storm of magnitude equivalent to the SDF would not cause overtopping of the dam or dike. Detailed hydraulic and hydrologic analyses are contained in Appendix 4.

e. Drawdown Data

No drawdown computations can be performed due to the apparent lack of outlet works.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Seepage was observed at the downstream toe of the dam and dike. In addition, the downstream surfaces of the dam and dike were found to be irregular, including a depressed area observed on the dam embankment below the spillway. These observations indicate the possibility of embankment distress.

b. Generalized Soils Description

The generalized soils description of the dam site consists of ground moraine composed of unconsolidated, unstratified material deposited during the Wisconsin glacial stage. The moraine overlies gneissic bedrock at or near the surface.

c. Design and Construction Data

The analysis of structural stability and construction data for the embankments are not available.

d. Operating Records

No operating records are available for the dam and dike. The water level of Lake Panorama is not monitored.

e. Post-Construction Changes

Reportedly, no post-construction changes have been made since the dam and dike were constructed in 1957.

f. Seismic Stability

Lake Panorama Dam and Dike are located in Seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams" which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions if they have adequate stability under static loading conditions. Lake Panorama Dam and Dike, which exhibit seepage and possible embankment sloughing, could be unstable under seismic loading conditions.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Lake Panorama Dam and Dike is assessed as being adequate. The spillway is able to pass the SDF without overtopping of the dam.

The embankment of the dam exhibits areas of seepage as well as possible sloughing on the downstream face. Also, the dike embankment exhibits seepage of its downstream toe. These conditions indicate that the embankments could become unstable if corrective measures are not implemented.

b. Adequacy of Information

Information sources for this report include 1) field inspections, 2) USGS quadrangle, and 3) consultation with personnel of the Lake Panorama Association. The information obtained is sufficient to allow a Phase I assessment as outlined in "Recommended Guidelines for Safety Inspection of Dams."

Some of the absent data are as follows:

1. Construction and as-built drawings.
2. Description of fill material for embankment.
3. Design computations and reports.
4. Maintenance documentation.
5. Soils report for the site.

c. Necessity for Additional Data/Evaluation

Although some data pertaining to Lake Panorama Dam and Dike are not available, additional data are not considered imperative for this Phase I evaluation.

7.2 Recommendations

a. Remedial Measures

Based on hydraulic and hydrologic analyses outlined in paragraph 5.1.a., the spillway is assessed as being adequate.

Variations in the slope of the downstream face of the dam together with areas of seepage were observed, indicating the possibility of embankment distress. In addition, seepage at the toe of the dike was observed. It is, therefore, recommended that a professional engineer experienced in the design and construction of dams be engaged in the near future to assess the stability of the dam and dike embankments. Base on the assessment, a design for embankment improvements should be prepared and the embankments should be repaired accordingly.

In addition, it is recommended that the following remedial measures be undertaken by the owner in the near future:

- 1) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.
- 2) The spillway discharge pipes should be cleaned of accumulated silt and debris and the intake and outlet ends should be reconstructed in such a manner as to ensure that silt and debris will not impede the design capacity of the spillway.

- 3) All adverse vegetation on the embankments should be removed.

b. Maintenance

In the future, the owner of the dam and dike should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam and dike.

- 3) All adverse vegetation on the embankment should be removed.

b. Maintenance

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

PLATES

LAKE PANORAMA DAM

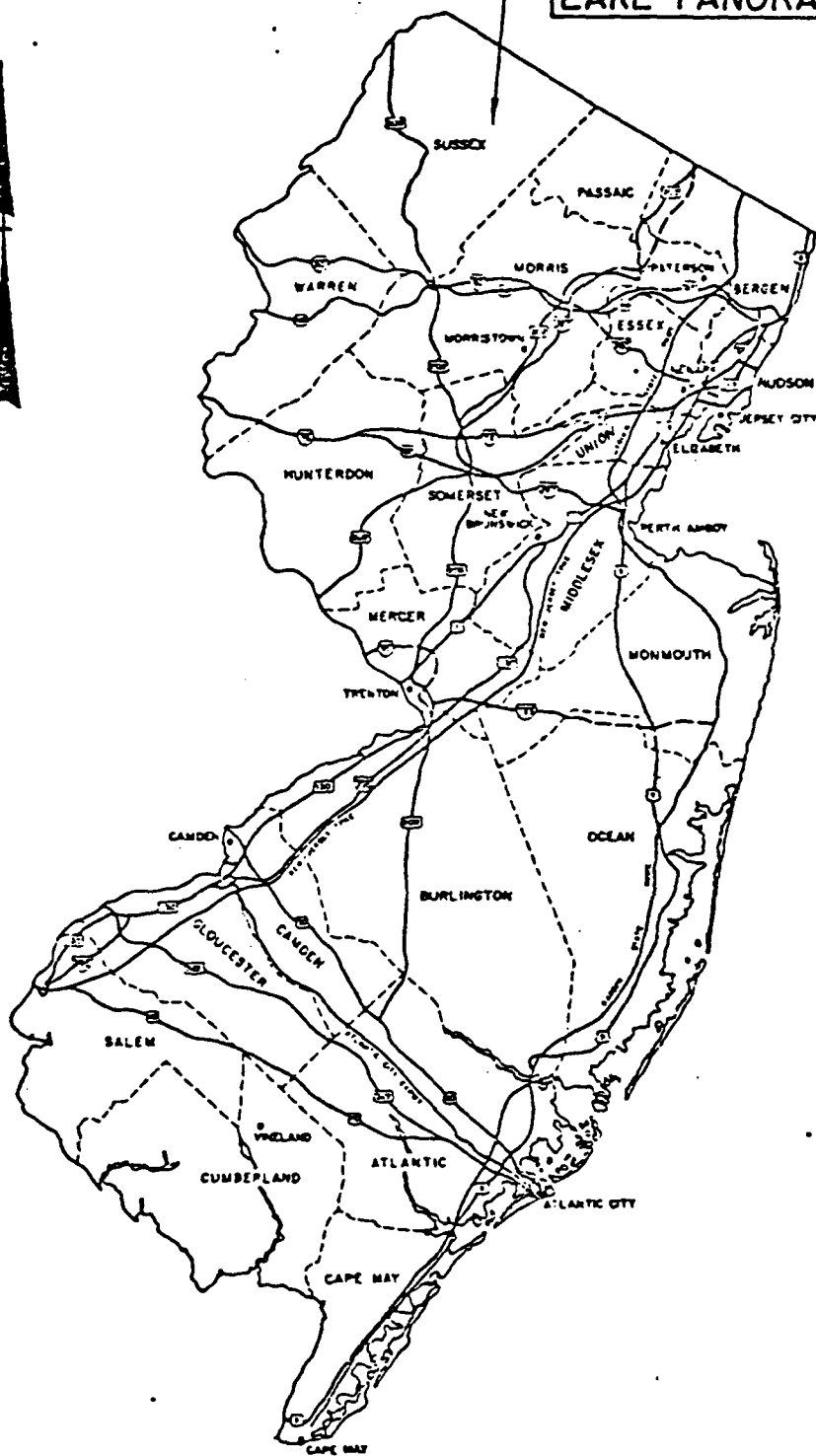


PLATE 1

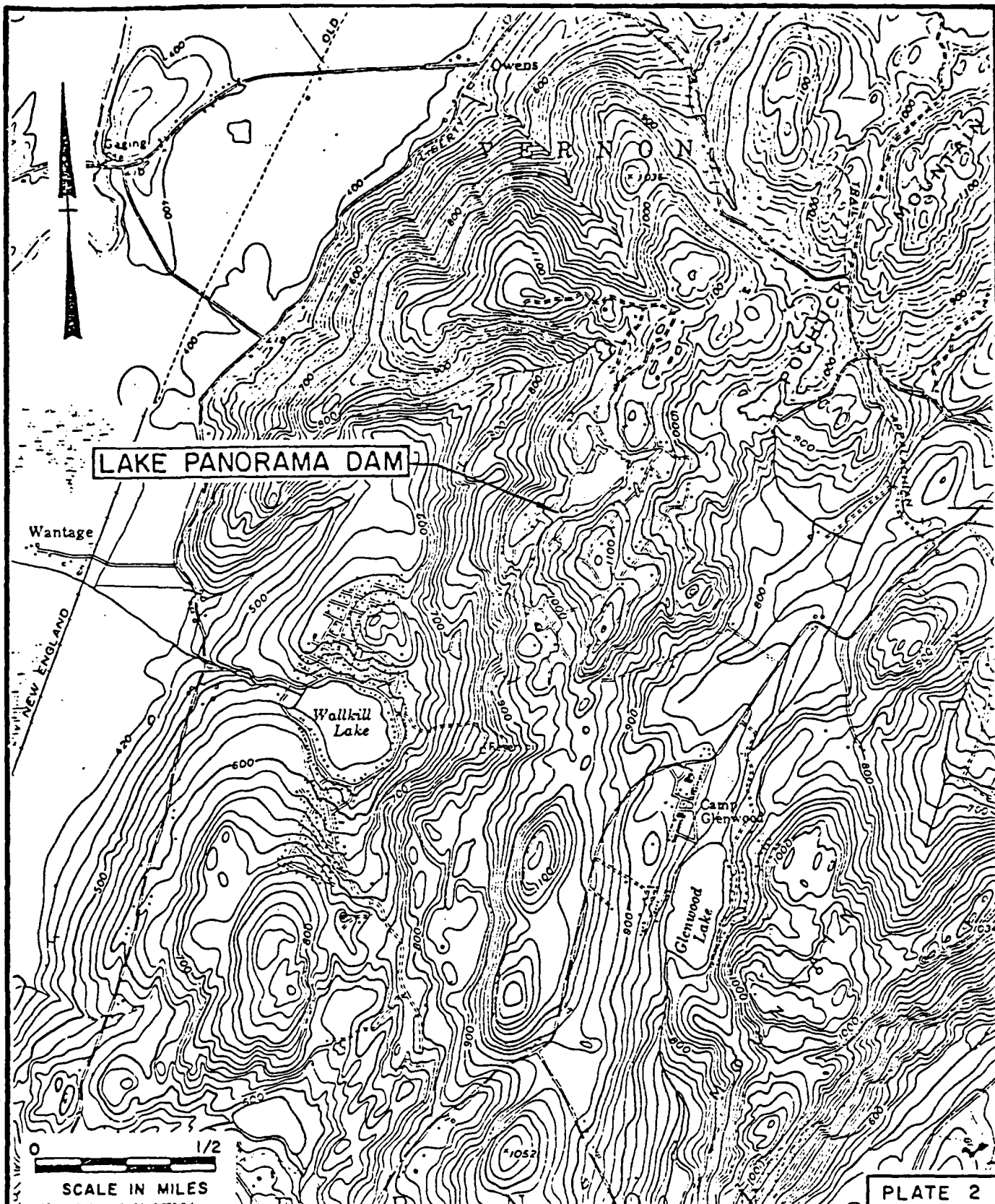
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DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

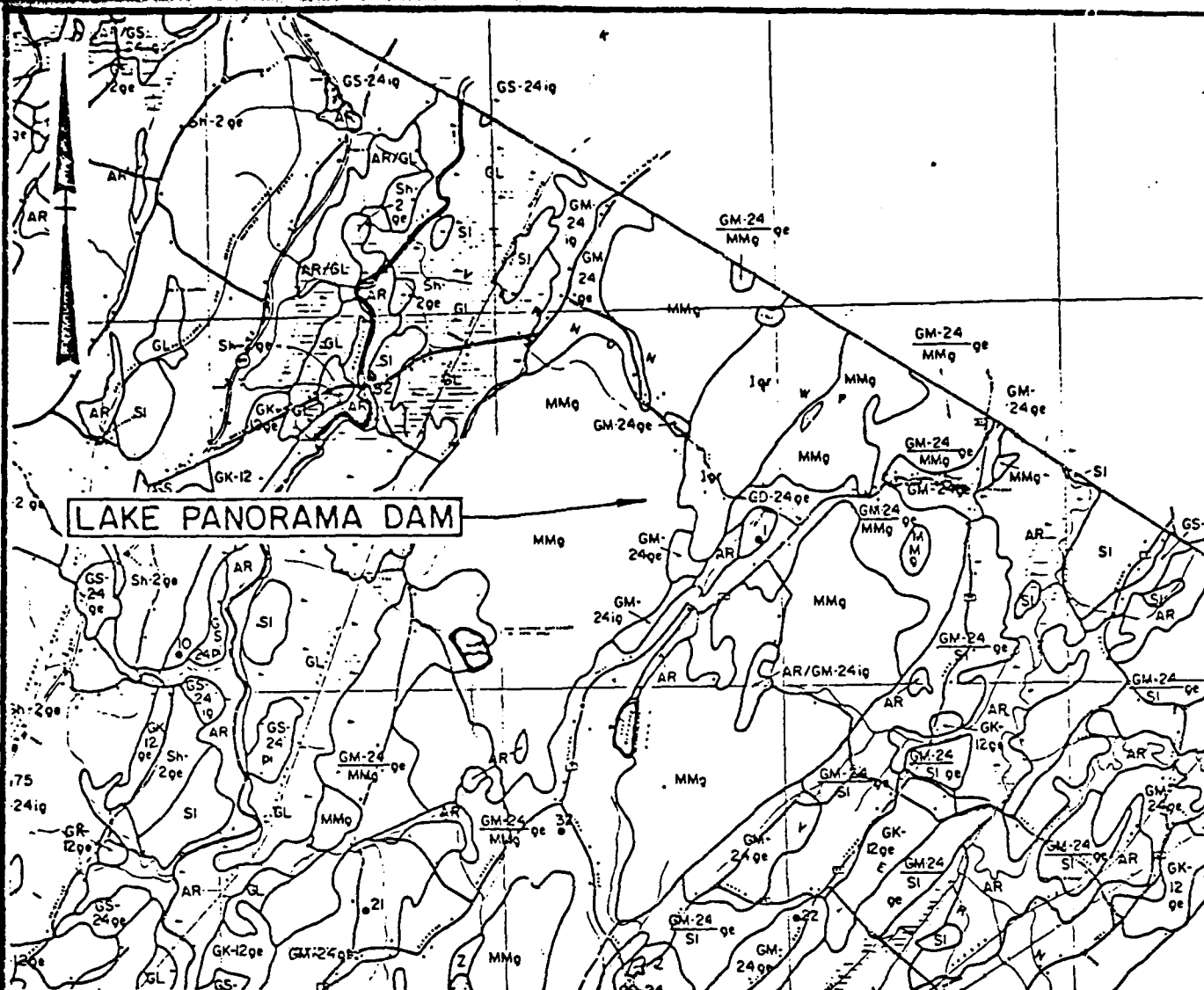
INSPECTION AND EVALUATION OF DAMS KEY MAP LAKE PANORAMA DAM

SCALE: NONE

DATE: FEB. 1981



<p>STORCH ENGINEERS FLORHAM PARK, NEW JERSEY</p>	<p>INSPECTION AND EVALUATION OF DAMS VICINITY MAP LAKE PANORAMA DAM</p>	
<p>DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY</p>		<p>SCALE: AS SHOWN</p>
		<p>DATE: FEB. 1981</p>



Legend

GM-24 Glacial ground moraine, composed of unconsolidated, unstratified material deposited during the Wisconsin glacial stage.

MMg Gneissic bedrock at or near the surface (Pre-Cambrian formation, Losee Gneiss).

Note: Information taken from Rutgers University, Soil Survey of New Jersey, Report No. 11, Sussex County, November 1953 and Geologic Map of New Jersey prepared by J.V. Lewis and H. Kummel 1910-1912, revised by H. B. Kummel 1931 and M. Johnson 1950.

PLATE 3

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TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

SOIL MAP
LAKE PANORAMA DAM

SCALE: NONE

DATE: FEB. 1981

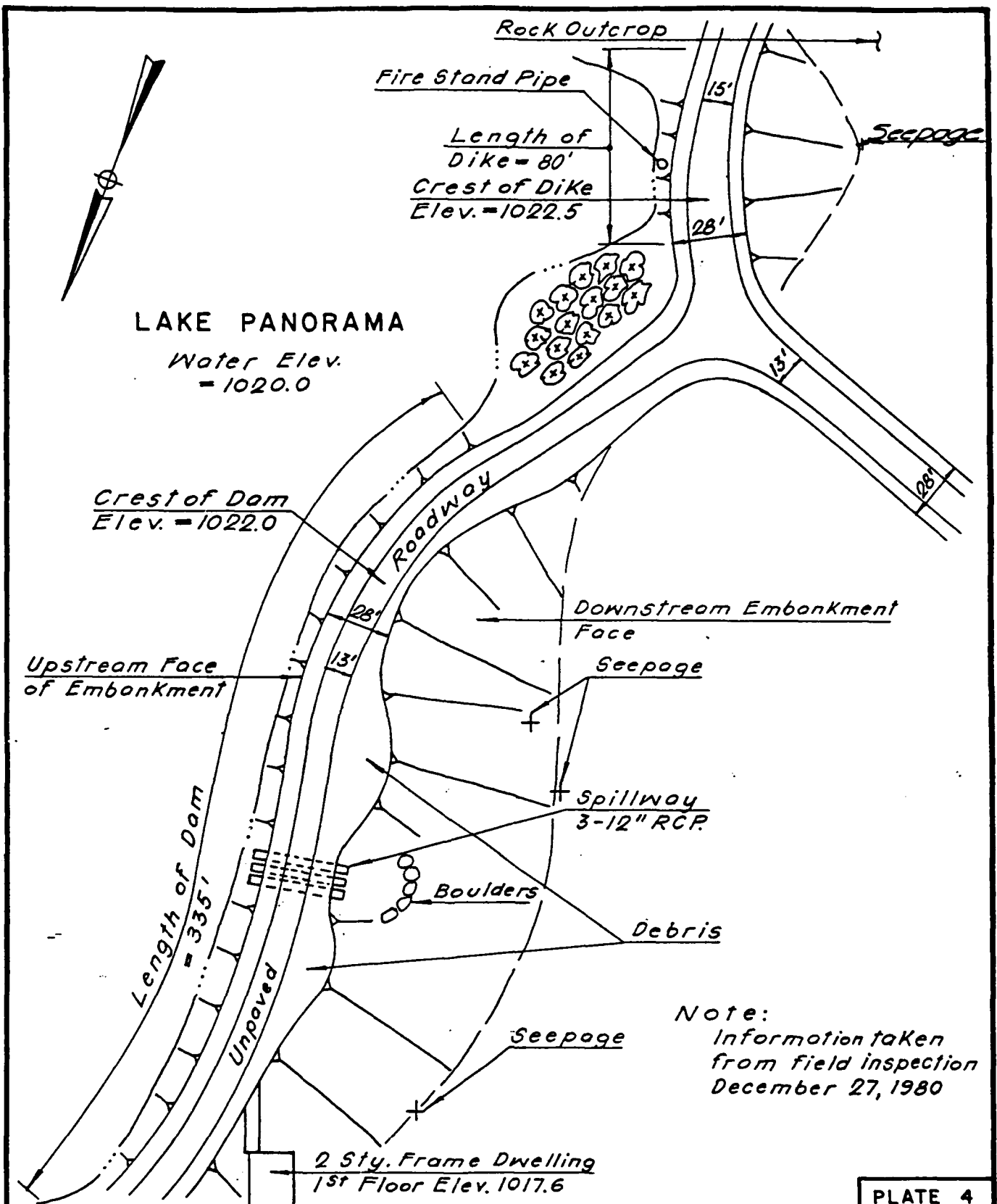


PLATE 4

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

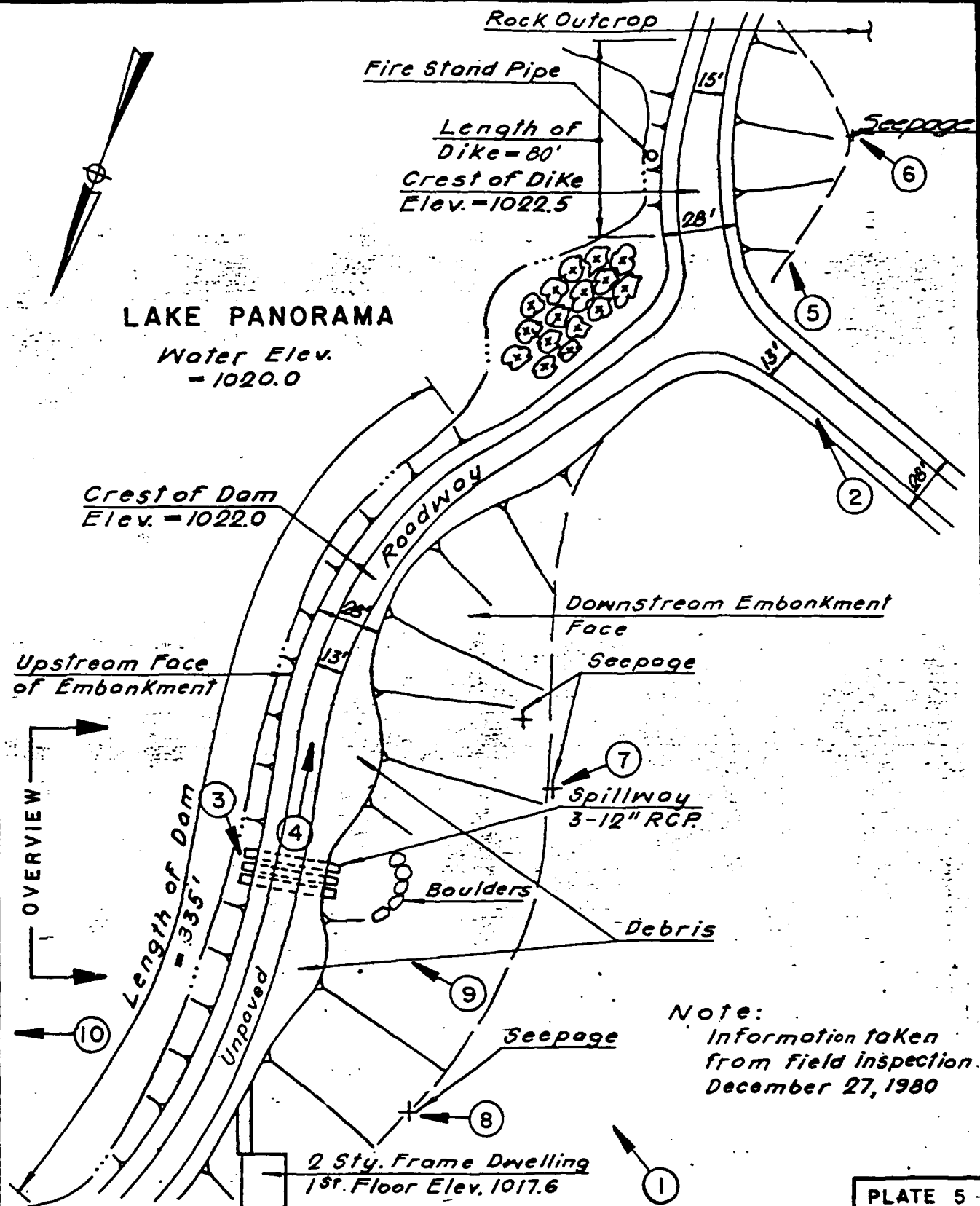
DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS
GENERAL PLAN
LAKE PANORAMA DAM

I.D. N.J. 00816

SCALE: NONE

DATE: FEB. 1981



STORCH ENGINEERS.
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS PHOTO LOCATION PLAN LAKE PANORAMA DAM

I.D. N.J. 00816

SCALE: NONE

DATE: FEB. 1981

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List

Visual Inspection

Phase I

Name of Dam Lake Panorama Dam County Sussex State N.J. Coordinators NJDEP

Date(s) Inspection 12/27/80 Weather Cloudy Temperature 30°F

Pool Elevation at time of Inspection 1019.9 M.S.L. Tailwater at Time of Inspection N.A. M.S.L.

Inspection Personnel:

<u>John Gribbin</u>	<u>Mark Brady</u>
<u>Charles Osterkorn</u>	<u>Richard McDermott</u>
<u>Daniel Buckelew</u>	

John Gribbin Recorder

Owner's representative not present

EMBANKMENT (DAM)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Unpaved road located along crest. Some boulders on upstream side at waterline. Grass, weeds and small trees located on both sides of dam. Downstream side also overgrown with briars and contains debris and fill dirt. A few boulders located on downstream face.	Boulders on upstream face appear to be inadequate as riprap. Trees and adverse vegetation should be removed.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Junctions appeared to be stable.	
ANY NOTICEABLE SEEPAGE	Three points of seepage noted at or near the toe. One near right end containing deposits of deep orange color and discharging at rate of 2 to 3 gal./min. Two points on left side of spillway containing orange colored deposits and discharging as a trickle.	Seepage should be investigated.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

EMBANKMENT (DAM)

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Downstream face irregularly graded. Soil in fill areas loosely compacted. Depressed area in vicinity of spillway.	Depressed area could be caused by embankment sloughing. Embankment stability should be investigated.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Possible sloughing on downstream face (see item above). Group of large boulders observed on downstream side below spillway could function as energy dissipator.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical: Generally level. Horizontal: Curved and irregular.	
RIPRAP	Evidence of riprap on upstream face at waterline. Boulders appeared insufficient for slope protection, however riprap not observed below water line.	Riprap should be renovated.

EMBANKMENT (DIKE)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Unpaved road located along crest. Downstream side overgrown with weeds, briars and small trees. Large boulders 3' to 5' located on downstream face.	Saddle on which dike was constructed appeared to contain principal stream draining lake area.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Junctions appeared sound. Abutments comprised of natural rock outcrops.	
ANY NOTICEABLE SEEPAGE	One point of seepage at toe. Seepage contained orange colored deposits and was flowing as a trickle.	Seepage should be investigated.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

EMBANKMENT (Dike)

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No significant sloughing observed. Downstream surface graded irregularly.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical: generally level and 0.5' higher than dam crest. Horizontal: Generally curved.	
RIPRAP	None observed.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	N/A	No low level outlet observed.
INTAKE STRUCTURE	N/A	
OUTLET STRUCTURE	N/A	
OUTLET CHANNEL	N/A	
GATE AND GATE HOUSING	N/A	

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONC. PIPES	The 3 concrete culvert pipes were in satisfactory condition.	
INTAKE	Pipes protrude from upstream face of embankment - no headwall or other stabilization observed.	
OUTFALL	Pipes protrude from downstream face of embankment - no headwall, apron or other stabilization observed. Discharge flows down embankment surface. Two pipes severely silted.	Pipes should be cleaned of silt. Area around outfall should be stabilized.

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Shores wooded with rock outcrops. Slopes steep, approx 50% to 100%.	
SEDIMENTATION	Unknown.	
STRUCTURES ALONG BANKS	Some homesites located on the slopes surrounding the lake. A road located along a portion of the upstream end of the lake.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTION, DEBRIS, ETC.)	No well defined channel observed downstream from the spillway. Spillway discharges onto downstream face of dam. Beyond toe, terrain continues to slope down side of mountain. Downstream from dike is well defined swale or gorge.	
SLOPES	Swale is rocky and wooded with steep sides having 50% to 100% slopes.	
STRUCTURES ALONG BANKS	Swale downstream from dike: local road crosses channel bed 1300 feet from dike. Dwelling located in channel bed 1300 feet from dike. Two dwellings located adjacent to channel bed 400 feet from dike.	
	Downstream from dam: road bridge and two dwellings 6000 feet from dam. Stream begins approx. 3000 feet from dam.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
DAM - PLAN	Not Available
SECTIONS	
SPILLWAY - PLAN	Not Available
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	Not Available
OUTLETS - PLAN	Not Available
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	
HYDRAULIC/HYDROLOGIC DATA	Not Available
RAINFALL/RESERVOIR RECORDS	Not Available
CONSTRUCTION HISTORY	Not Available
LOCATION MAP	Not Available

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Not Available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM INSTABILITY SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not Available
POST-CONSTRUCTION SURVEYS OF DAM	Not Available
BORROW SOURCES	Not Available

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Not Available
HIGH POOL RECORDS	Not Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Not Available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Not Available
MAINTENANCE OPERATION RECORDS	Not Available

APPENDIX 2

Photographs



PHOTO 1

DOWNSTREAM FACE OF DAM WITH LAKE IN BACKGROUND



PHOTO 2

CREST OF DIKE WITH DOWNSTREAM FACE TO
THE RIGHT AND LAKE TO THE LEFT

LAKE PANORAMA DAM

20 JANUARY 1981



PHOTO 3

SPILLWAY - INTAKE END



PHOTO 4

CREST OF DAM

LAKE PANORAMA DAM

27 DECEMBER 1980



PHOTO 5
DOWNSTREAM FACE OF DIKE

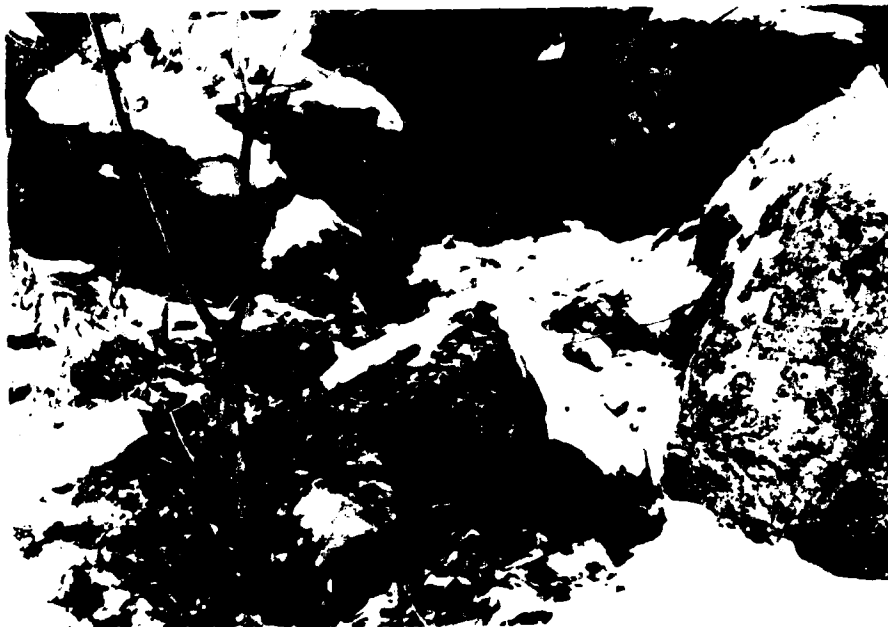


PHOTO 6
SEEPAGE AT TOE OF DIKE

LAKE PANORAMA DAM
27 DECEMBER 1980



PHOTO 7

SEEPAGE AT TOE OF DAM

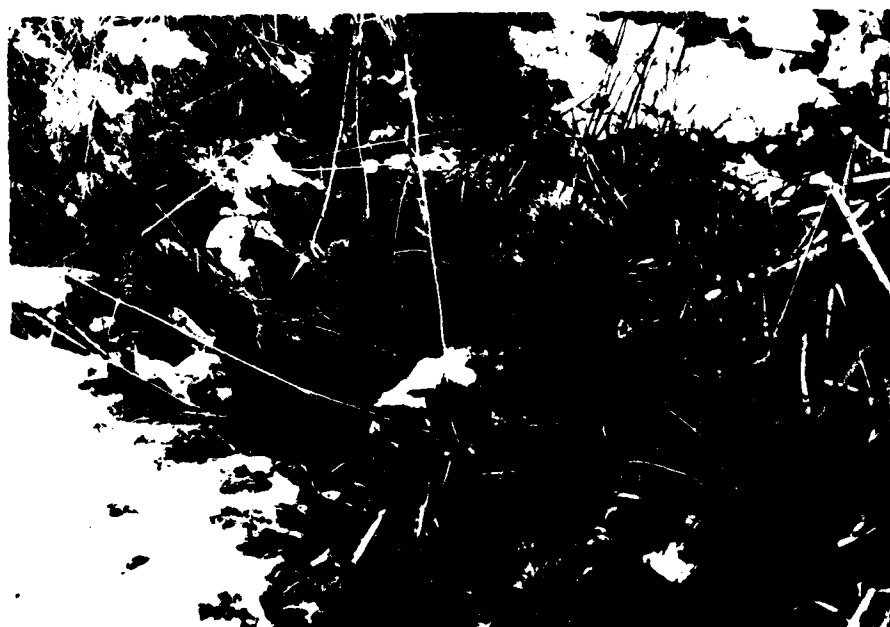


PHOTO 8

SEEPAGE AT TOE OF DAM - RIGHT END

LAKE PANORAMA DAM

27 DECEMBER 1980



PHOTO 9

DOWNSTREAM FACE OF DAM



PHOTO 10

LAKE PANORAMA

LAKE PANORAMA DAM
27 DECEMBER 1980

APPENDIX 3

Engineering Data

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Steep, Wooded

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1020.0 (64 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N A

ELEVATION MAXIMUM DESIGN POOL: 1021.2

ELEVATION TOP DAM: 1022.0

SPILLWAY CREST: _____

a. Elevation 1020.0

b. Type Three 12-inch concrete culvert pipes

c. Width 3 feet

d. Length 28.2 feet

e. Location Spillover Downstream face of embankment

f. Number and Type of Gates None

OUTLET WORKS: None known

a. Type N.A.

b. Location N.A.

c. Entrance Invert N.A.

d. Exit Invert N.A.

e. Emergency Draindown Facilities: _____

HYDROMETEOROLOGICAL GAGES: None known

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake Stage Equal to Top of Dam) 15 c.f.s.

APPENDIX 4

Hydraulic/Hydrologic Computations

Project LAKE PANORAMA DAMMade By CLO Date 1/19/81Chkd By JG Date 2/19/81HYDROLOGY

HYDROLOGIC ANALYSIS - RUNOFF HYDROGRAPH WILL
BE DEVELOPED BY THE HEC-1-DAM COMPUTER
PROGRAM USING THE SCS UNIT HYDROGRAPH
WITH CURVILINEAR TRANSFORMATION.

DRAINAGE AREA = 0.06 SQUARE MILES

INFILTRATION DATA

INITIAL INFILTRATION = 1.5 inches

CONSTANT INFILTRATION = 0.15 inches/hour

TIME OF CONCENTRATION

1) SCS - TR55

OVERLAND FLOW $L = 800'$

$1110 - 1020 = 90'$

SLOPE = 11.25%

OVERLAND VELOCITY = 0.85 ft./sec.

$$T_c = \left(\frac{800}{.85} \right) \frac{1}{3600} = \underline{0.26 \text{ hour}}$$

TIME OF CONCENTRATION (con't)

2) "HANDBOOK OF HYDROLOGY" BY CHOW - KERBY

$$T_c^{2.14} = \frac{2}{3} L n / \sqrt{S}$$

Where: T_c = overland time of concentration (min.) L = length of overland flow (ft) n = Mannings coeff. ($n = 0.4$) S = slope (ft/ft)

$$T_c^{2.14} = \frac{2 (800) (.4)}{3 \sqrt{.1125}} = 636$$

$$T_c = 20.4 \text{ minutes} = \underline{0.34 \text{ hours}}$$

FOR COMPUTER INPUT

$$\underline{\text{LAG TIME}} \quad \text{use } T_c = .30 \text{ hours}$$

$$\text{LAG} = 60\% T_c = \underline{0.18 \text{ hours}}$$

STORCH ENGINEERS

Sheet 3 of 7Project LAKE PANORAMAMade By CLO Date 7/24/81Chkd By JG Date 7/24/81PRECIPITATION24 HOUR, 100 YEAR RAINSTORM
DISTRIBUTION FOR LAKE PANORAMATIME (HOURS)RAIN (inches)

1	0.075
2	0.075
3	0.075
4	0.075
5	0.075
6	0.075
7	0.075
8	0.075
9	0.075
10	0.075
11	0.075
12	0.075
13	0.15
14	0.15
15	0.15
16	0.33
17	0.65
18	3.00
19	0.65
20	0.33
21	0.33
22	0.15
23	0.15
24	0.15

STORCH ENGINEERS

Project LAKE PANORAMA DAM

Sheet 4 of 7

Made By CLO Date 1/20/81

Chkd By JG Date 2/19/81

LAKE STORAGE VOLUME

WATER SURFACE ELEVATION

AREA (ACRES)

1000

0

1020

9.64

1040

16.53

1060

23.88

HEC-1 - DAM COMPUTER PROGRAM WILL

DEVELOP STORAGE CAPACITY FROM

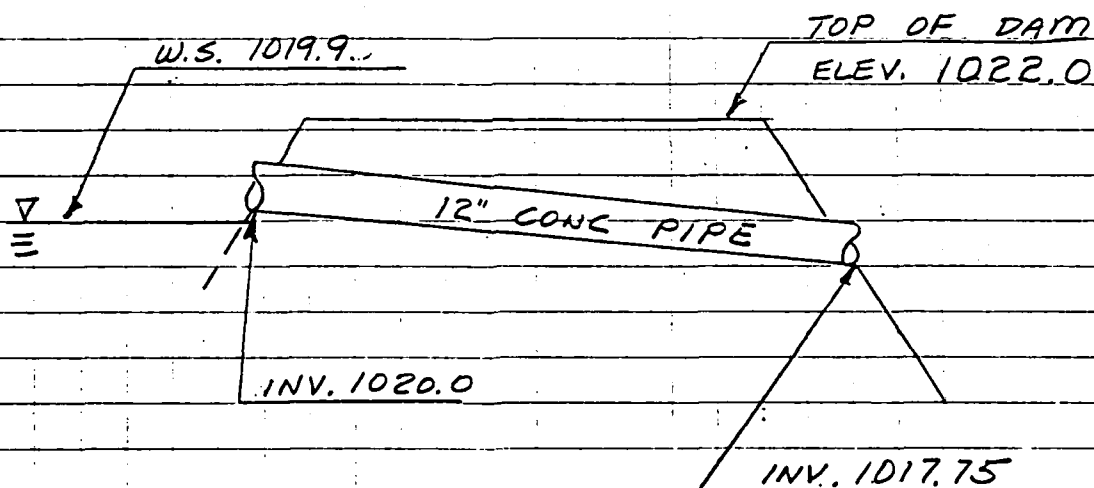
SURFACE AREAS AND ELEVATIONS.

INFORMATION TAKEN FROM USGS

HAMBURG QUADRANGLE.

HYDRAULICS

THE SPILLWAY AT THE LAKE PANORAMA DAM CONSISTS OF THREE 12" CONCRETE PIPES 28.2 FEET LONG WITH THE UPSTREAM INVERT BEING AT ELEVATION 1020.0 AND THE DOWNSTREAM INVERT BEING AT INVERT 1017.75.



DISCHARGE WILL CALCULATED FROM THE "HYDRAULIC CHARTS FOR THE SELECTION OF HIGHWAY CULVERTS" USING INLET CONTROL.

STORCH ENGINEERS

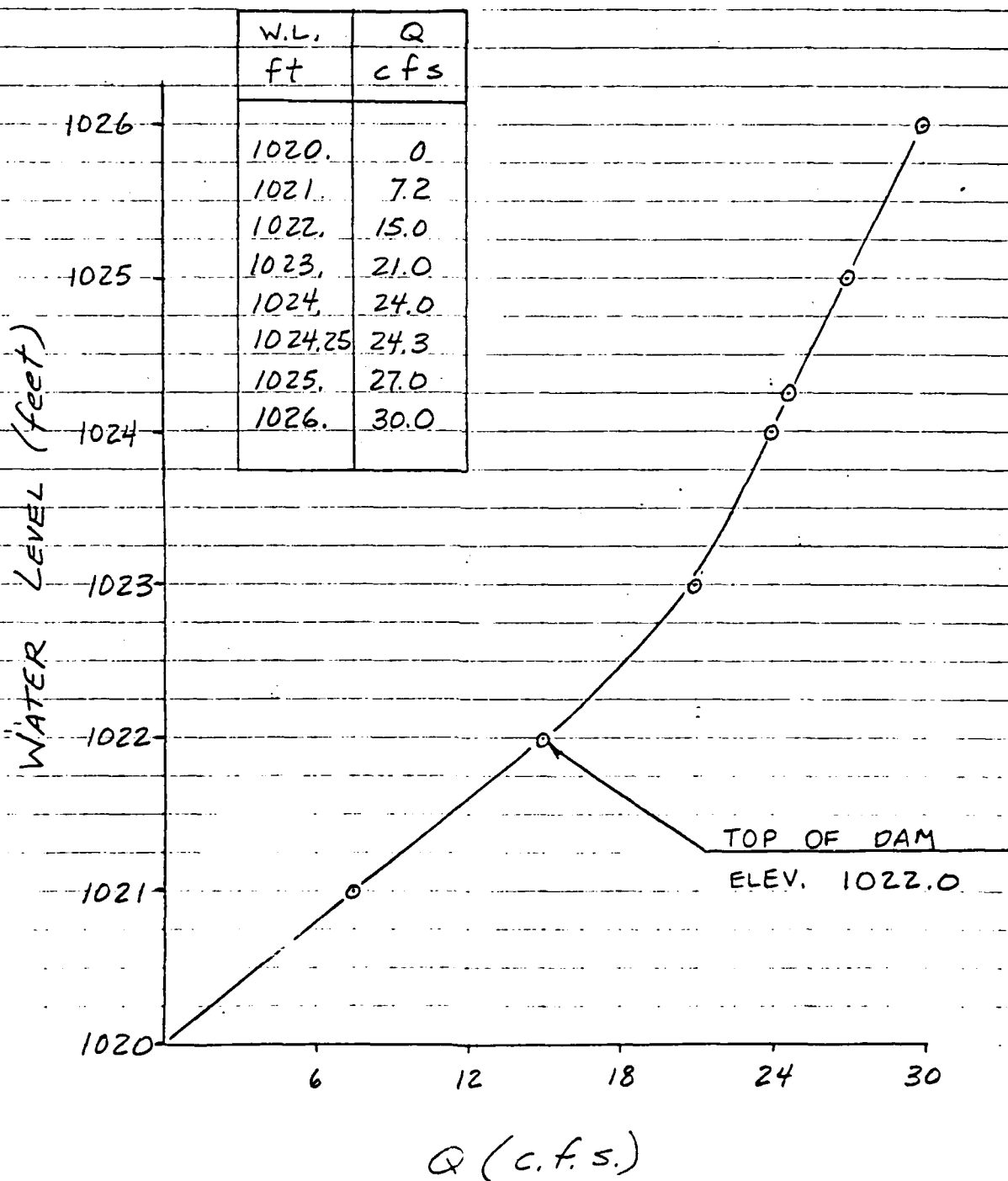
Sheet 6 of 7Project LAKE PANORAMA DAMMade By CLO Date 11/1/81Chkd By JG Date 2/19/81

SPILLWAY STAGE DISCHARGE TABULATION

SQUARE 4 X 4 TO THE INCH

water surface elevation	$\frac{HW}{D}$	Q (cfs)	Q TOTAL (3 PIPES) (c.f.s.)
1020.0	0	0	0
1021.0	1	2.4	7.2
1022.0	2	5.0	15.0
1023.0	3	7.0	21.0
1024.0	4	8.0	24.0
1024.25	4.25	8.1	24.3
1025.0	5	9.0	27.0
1026.0	6	10.0	30.0

FROM THE "HYDRAULIC CHARTS FOR
THE SELECTION OF CULVERTS" CHART
NO. 2 - GROOVED END PROJECTING.

SPILLWAY STAGE DISCHARGE CURVE

HEC - 1 - DAM PRINTOUT

Overtopping Analysis

NATIONAL DAM SAFETY PROGRAM
LAKE PANORAMA DAM, NEW JERSEY
100 YEAR STORM ROUTING

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	4	0
JOBER 5									
LROFI 0									
LROFI 0									
LROFI 0									

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NR110= 1 LR110= 1

RTIOS= 1.00

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO LAKE PANORAMA DAM

ISTAD	ICOMF	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.06	0.00	.06	0.00	0.000	0	1	0

LOSS DATA

LROFI	SIRKR	DLIKR	RIIOL	ERAIN	SIRKS	RIIOK	SIRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.15	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG=.18

RECESSION DATA

SIRIO= -1.00 QRCSN= -.05 RTIOR= 2.00

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP	RAIN	EXCS	LOSS	COMP
0	0	0	0	0	0	0	0	0	0	0

SUM 7.12 4.33 2.79 737.
(181.)(110.)(71.)(20.87)

ROUTE DISCHARGE THROUGH DAM

ELEVATION= 1000. 1020. 1040. 1060.

PEAK OUTFLOW IS 8. AT TIME 19.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN RATIO 1	1.00
HYDROGRAPH AT	LANE	.06	1	110.
	(.16)	(3.11)
ROUTED TO	DAM	.06	1	8.
	(.16)	(.24)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1								
INITIAL VALUE		SPILLWAY CREST		TOP OF DAM				
ELEVATION		1020.00		1020.00				
STORAGE		64.		84.				
OUTFLOW		0.		15.				
				0.				
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION		TIME OF	
					OVER TOP HOURS	MAX OUTFLOW HOURS	FAILURE HOURS	
1.00	1021.17	0.00	76.	8.	0.00	19.50	0.00	

APPENDIX 5

Bibliography

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